

# Modeling FMD in the US

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# FMD virus

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- Highly contagious
- Survives in meat, milk, blood, semen, moist environment.
- Affects cloven hoofed animals susceptible (pigs, sheep, goats, cattle, swine, deer, etc.)



# Lesions and clinical signs

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- High morbidity, low mortality
- May be inapparent in sheep and goats
- Clinically indistinguishable from VS, VES, BVD, IBR...



# FMDV transmission

- Direct contact among animals
- Indirect contact
- Airborne spread
- Local area spread



# FMD Epidemics (US and UK)

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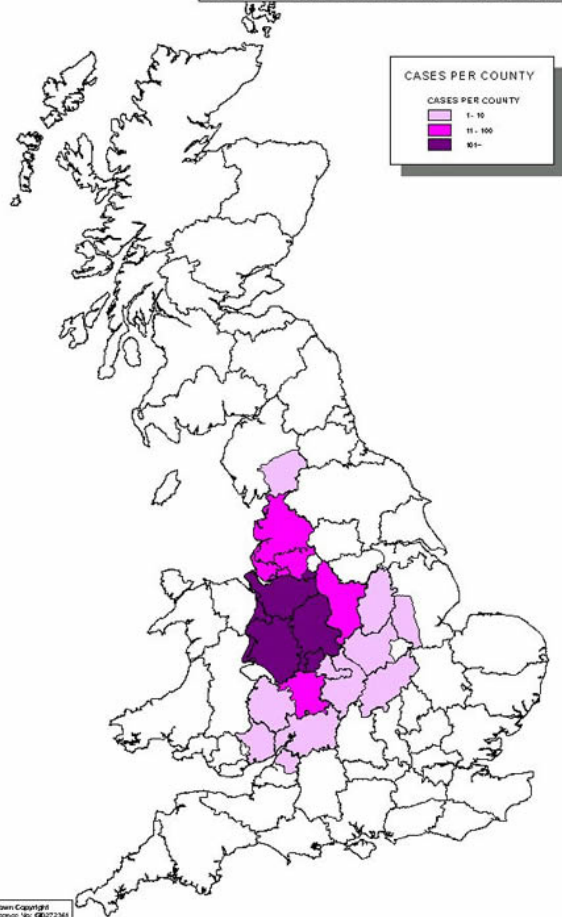
Country	Year	Herds affected	Animals slaughtered
US	1924	948	131,000
	1929	33	3,600
UK	1967/68	2,339	443,000
	1981	1	?
	2001	9,318	6.5 million
	2007	8	1,578



# FMD Outbreaks in the UK

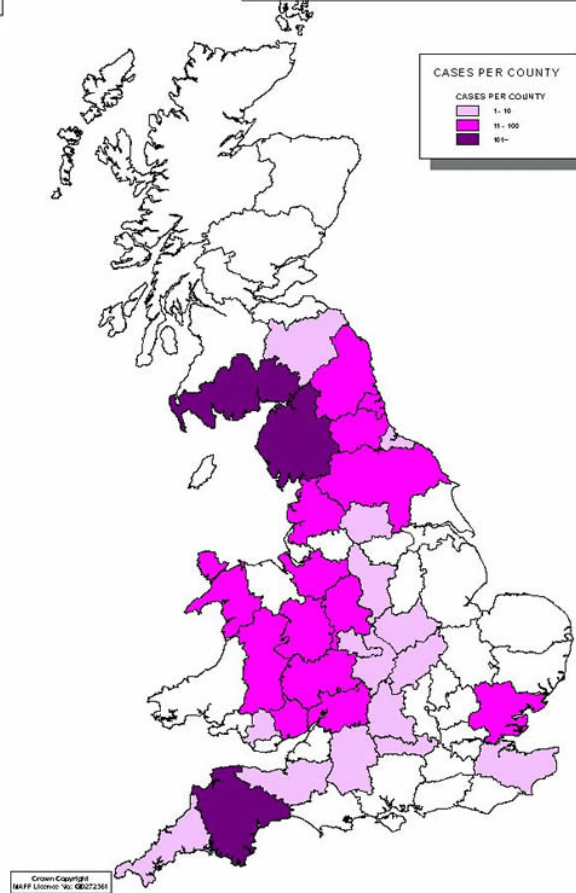
1967

INFECTED PREMISES BY COUNTY - 1967/8 OUTBREAK



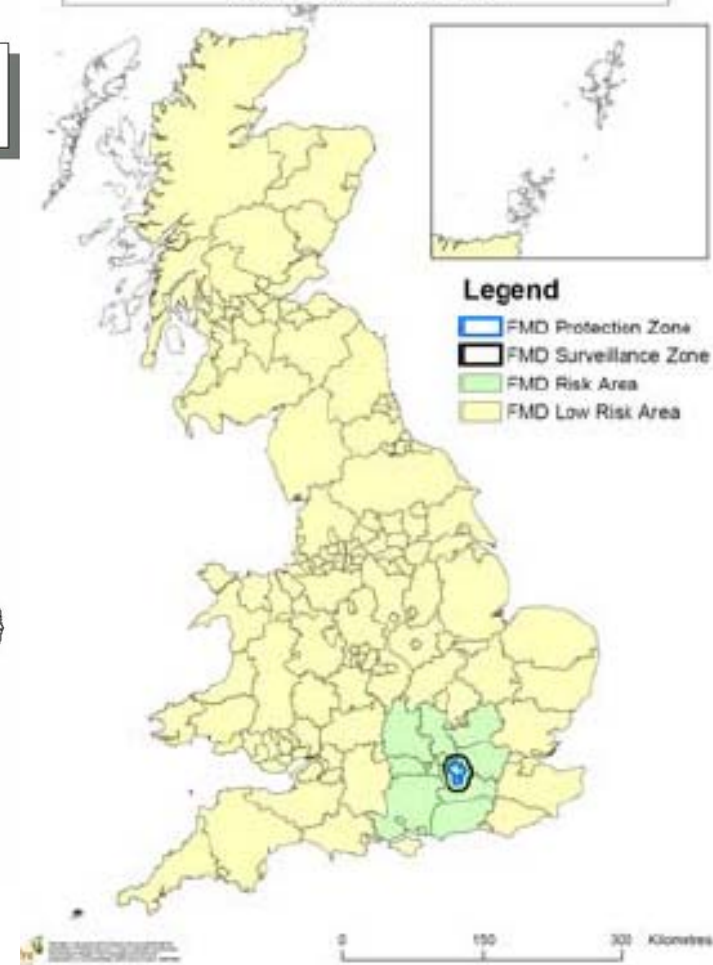
2001

INFECTED PREMISES BY COUNTY - 2001 OUTBREAK



2007

FMD Risk Area and Low Risk Area with September Protection Zone and Surveillance Zone.





Slaughter/Disposal Numbers = 6-10 million livestock  
("officially" 6,456,000: 10% of UK total)



Daily average of animals slaughtered = 9,000 - 80,000  
Peak daily disposal = 100,000 carcasses

Photo: Pam Hullinger, CDFA





Photo: Pam Hullinger, CDFA

On-Farm Burial



# On-Farm Pyres



Photo: Pam Hullinger, CDFA

# Economic impact of FMD

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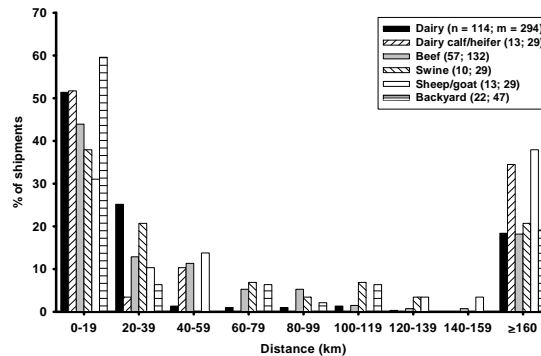
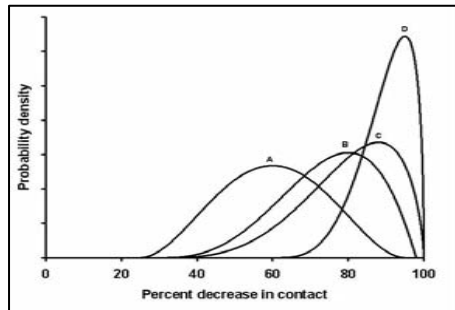
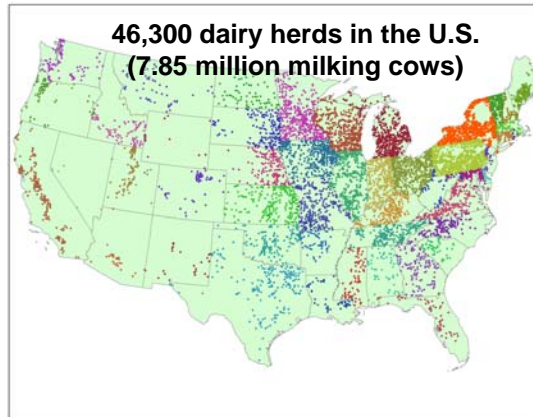
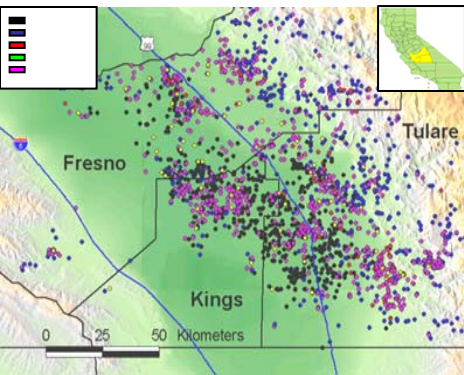
- Trade restrictions on beef, dairy, pork exports
- \$37 billion (2001 dollars) to US economy  
(McCauley *et al.*, 1979)
- \$4-13 billion impact on US economy (Ekboir, 1998)
- 13% decrease in export revenue  
(Paarlberg, 2005)
- £9+ billion impact on UK economy  
(7/2001)





# Davis Animal Disease Simulation (DADS) Model

- 30 years FMD modeling
- Spatial
- Stochastic
- Data driven
- National level spread & control



## - GENERAL LIVESTOCK -

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STUDY OF ANIMAL MOVEMENTS AND CONTACTS

Responses will remain strictly confidential.

1. Do you currently own or raise cloven-hoofed livestock, ☐ Yes ☐ No (Please return the questionnaire in the envelope provided and thank you for your time and interest)

2. How would you classify your herd or flock? (Circle all codes that apply)

CODE No. HERD OR FLOCK TYPE

1 Beef (cow-calf)

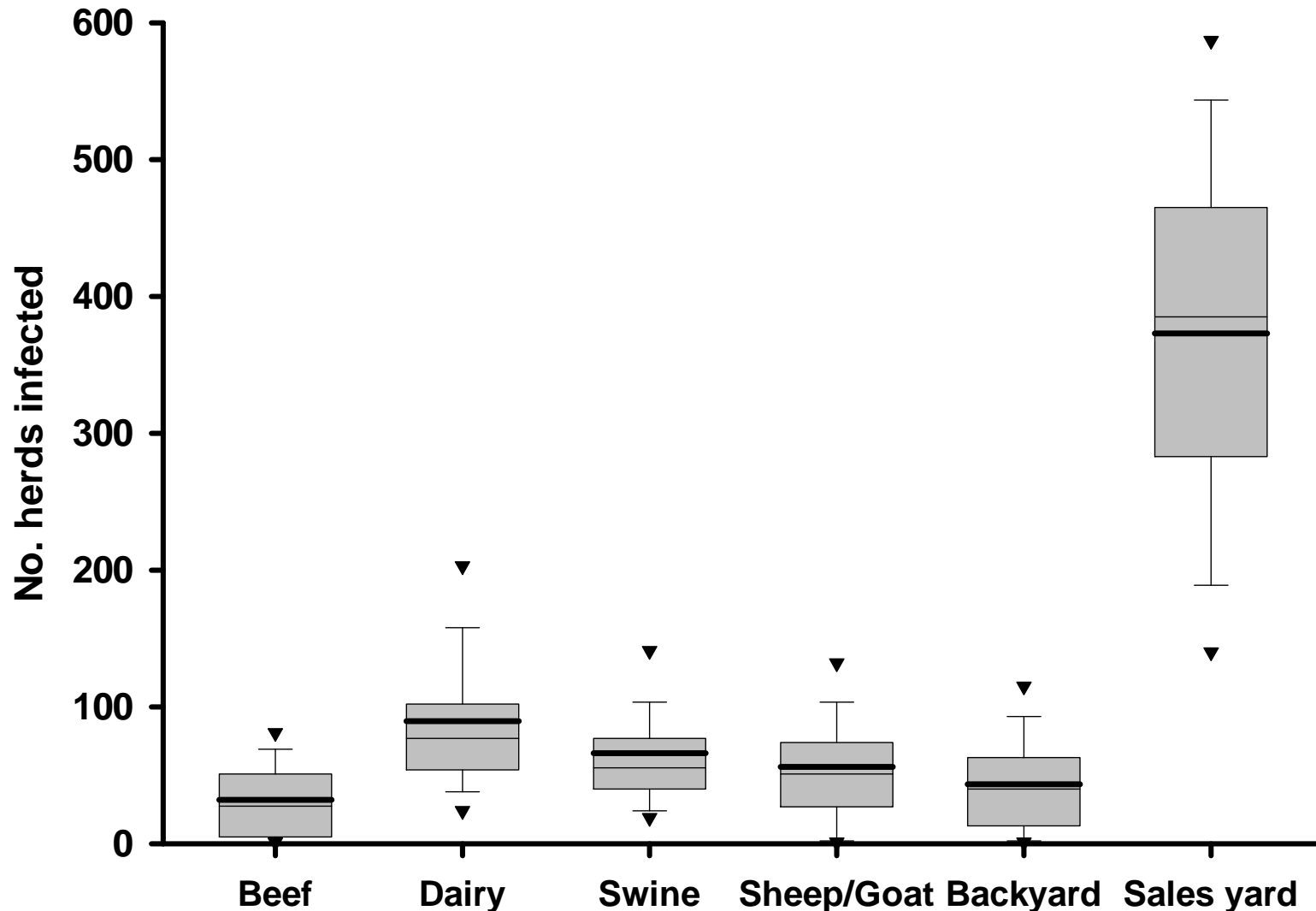
8 Swine (farrow-to-wean)

15 Sheep (range flock)

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VETERINARY  
MEDICINE

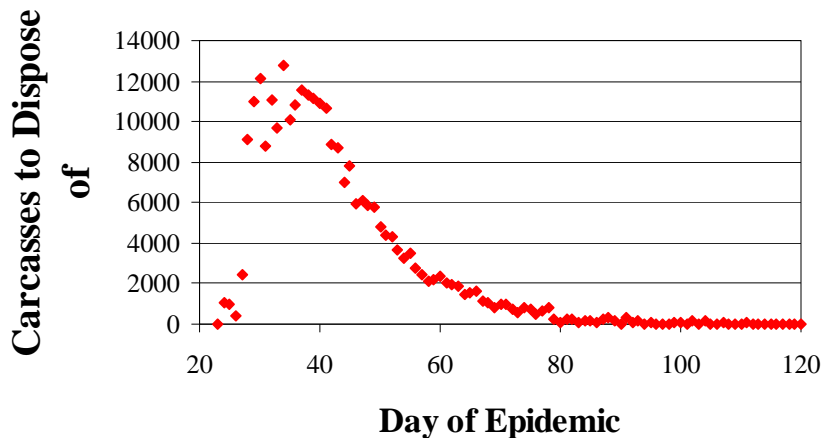
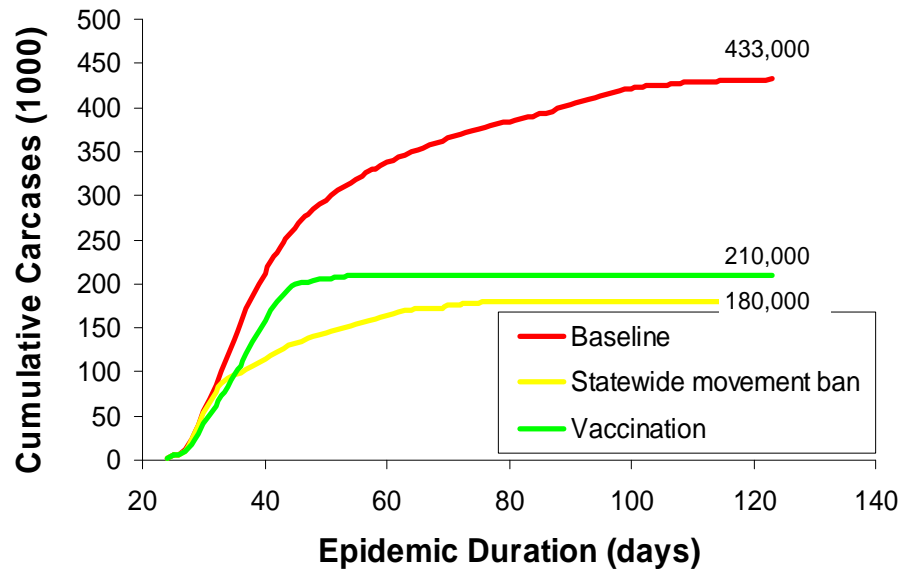


# Relative Importance of Index Case Type (3 co. CA)





# Results (day/location-specific)



- Vaccination will reduce the impact by  $\frac{1}{2}$ ; trade problems
- Animal movement ban as effective; without trade restrictions
- As in UK 2001, we are unprepared to deal with carcass disposal

# FMD in Kansas: the movie